

What is claimed is:

1 1. In a gas generating device wherein a fuel material reacts to
2 generate gas, the improvement comprising:
3 a first chamber having contents including a quantity of a water-supplying compound
4 and a quantity of a fuel precursor, the fuel precursor being water reactive; and
5 an initiator in discharge communication with at least a portion of the
6 quantity of water-supplying compound content of said first chamber to form water,
7 with at least a portion of the formed water reacting with at least a portion of the
8 quantity of fuel precursor to form a quantity of the fuel material and resulting in
9 opening of said first chamber with a release of at least a portion of the fuel material
10 therefrom.

1 2. The gas generating device of claim 1 wherein the first chamber
2 contents include at least a portion of the quantity of water-supplying compound and
3 at least a portion of the quantity of the fuel precursor stored in direct contact.

1 3. The gas generating device of claim 2 wherein, in a static state, the
2 first chamber is closed, the gas generating device additionally comprising:
3 a second chamber in fluid communication with said first chamber upon
4 the opening of said first chamber, said second chamber containing a quantity of
5 pressurized stored gas including a quantity of oxidant material, with at least a portion

6 of the fuel material released from said first chamber reacting with at least a portion of
7 the oxidant material to form product gas, said second chamber adapted to open to emit
8 at least a portion of the product gas therefrom.

1 4. The gas generating device of claim 1 wherein in an at rest
2 condition, the quantity of water-supplying compound is stored segregated from the
3 quantity of the fuel precursor within said first chamber.

1 5. The gas generating device of claim 4 wherein, in a static state, the
2 first chamber is closed, the gas generating device additionally comprising:
3 a second chamber in fluid communication with said first chamber upon
4 the opening of said first chamber, said second chamber containing a quantity of
5 pressurized stored gas including a quantity of oxidant material, with at least a portion
6 of the fuel material emitted from said first chamber reacting with at least a portion of
7 the oxidant material to form product gas, said second chamber adapted to open to emit
8 at least a portion of the product gas therefrom.

1 6. The gas generating device of claim 1 wherein the first chamber
2 is defined at least in part by a perforated housing.

1 7. The gas generating device of claim 6 additionally comprising a
2 second chamber in fluid communication with said first chamber, said second chamber
3 containing a quantity of pressurized stored gas including a quantity of oxidant
4 material, with at least a portion of the fuel material released from said first chamber
5 reacting with at least a portion of the oxidant material to form product gas, said second
6 chamber adapted to open to emit at least a portion of the product gas therefrom.

1 8. The gas generating device of claim 7 additionally comprising a
2 liner within the first chamber perforated housing, the liner maintaining the first
3 chamber contents in discharge communication proximity with the initiator device.

1 9. The gas generating device of claim 1 wherein the fuel precursor
2 is at least one metal element-containing material selected from the group consisting
3 of:
4 hydrides, carbides, alkoxides and combinations thereof.

1 10. The gas generating device of claim 1 wherein the fuel precursor
2 comprises a metal alkoxide.

1 11. The gas generating device of claim 10 wherein the fuel precursor
2 comprises an alkali metal.

1 12. The gas generating device of claim 10 wherein the fuel precursor
2 comprises an alkaline earth metal.

1 13. The gas generating device of claim 1 wherein the fuel precursor
2 comprises at least one first component selected from the group of metals and
3 organometallic compounds and at least one second component selected from the group
4 of carbonates and bicarbonates.

1 14. The gas generating device of claim 1 wherein the fuel precursor
2 comprises potassium t-butyl carbonate.

1 15. The gas generating device of claim 1 wherein the water-supplying
2 compound comprises ammonium nitrate.

1 16. The gas generating device of claim 1 wherein the water-supplying
2 compound comprises an inorganic compound with stabilized waters of hydration.

1 17. The gas generating device of claim 16 wherein the
2 water-supplying compound comprises hydrated calcium oxylate.

1 18. An apparatus for inflating an inflatable device, said apparatus
2 comprising:

3 a closed first chamber having contents including a quantity of
4 ammonium nitrate and a quantity of a fuel precursor, the fuel precursor being water
5 reactive;

6 an initiator in discharge communication with the contents of the first
7 chamber for initiating decomposition of at least a portion of the quantity of ammonium
8 nitrate to form water, with at least a portion of the formed water reacting with at least
9 a portion of the quantity of fuel precursor to form a fuel material, said first chamber
10 adapted to open when a predetermined increase in pressure within the first chamber
11 is realized whereby at least a portion of the fuel material is emitted from said first
12 chamber, and

13 a second chamber containing a quantity of pressurized stored gas
14 including a quantity of oxidant material, said second chamber in fluid communication
15 with said first chamber upon the opening of said first chamber with at least a portion
16 of the fuel material emitted from said first chamber reacting with at least a portion of
17 the oxidant material to form inflation gas, said second chamber adapted to open when
18 a predetermined increase in pressure within the second chamber is realized whereby
19 at least a portion of the product gas is emitted from the second chamber to inflate the
20 inflatable device.

1 19. The apparatus of claim 18 wherein the first chamber contents
2 include at least a portion of the quantity of water-supplying compound and at least a
3 portion of the quantity of the fuel precursor stored in direct contact.

1 20. The apparatus of claim 18 wherein in an at rest condition, the
2 quantity of water-supplying compound is stored segregated from the quantity of the
3 fuel precursor within said first chamber.

1 21. The apparatus of claim 18 wherein the fuel precursor is at least
2 one metal element-containing material selected from the group consisting of:
3 hydrides, carbides, alkoxides and combinations thereof.

1 22. The apparatus of claim 18 wherein the fuel precursor comprises
2 a metal alkoxide.

1 23. The apparatus of claim 18 wherein the fuel precursor comprises
2 at least one first component selected from the group of metals and organometallic
3 compounds and at least one second component selected from the group of carbonates
4 and bicarbonates.

1 24. The apparatus of claim 18 wherein the fuel precursor comprises
2 potassium t-butyl carbonate.

1 25. In a method for inflating an inflatable safety device via an inflator
2 device wherein a fuel material reacts to form gas generation reaction products, the
3 improvement comprising:

4 heating a mixture containing at least a water-supplying compound and
5 a water-reactive fuel precursor within the inflator device to form the fuel material in
6 situ.

1 26. The method of claim 25 additionally comprising:
2 contacting the formed fuel material with a quantity of compressed gas,
3 the compressed gas including a quantity of oxidant,
4 reacting at least a portion of the formed fuel material with at least a
5 portion of the quantity of oxidant to produce heat,
6 heating a stored quantity of inert gas with at least a portion of the
7 produced heat to form an increased volume of gas and
8 passing at least a portion of the increased volume of gas into the
9 inflatable safety device to effect the inflation thereof.

1 27. The method of claim 25 wherein the fuel precursor is at least one
2 metal element-containing material selected from the group consisting of:
3 hydrides, carbides, alkoxides and combinations thereof.

1 28. The method of claim 25 wherein the fuel precursor comprises a
2 metal alkoxide.

1 29. The method of claim 25 wherein the fuel precursor comprises at
2 least one first component selected from the group of metals and organometallic
3 compounds and at least one second component selected from the group of carbonates
4 and bicarbonates.

1 30. The method of claim 25 wherein the fuel precursor comprises
2 potassium t-butyl carbonate.

1 31. The method of claim 25 wherein the water-supplying compound
2 comprises ammonium nitrate.

1 32. In a vehicular inflatable safety assembly wherein a fuel material
2 reacts to form gas generation reaction products, the improvement comprising:

3 the vehicular inflatable safety assembly containing a quantity of a
4 water-supplying compound and a quantity of a water-reactive fuel precursor effective
5 upon initiation to form the fuel material in situ.

1 33. The vehicular inflatable safety assembly of claim 32 wherein the
2 fuel precursor is at least one metal element-containing material selected from the
3 group consisting of:

4 hydrides, carbides, alkoxides and combinations thereof.

1 34. The vehicular inflatable safety assembly of claim 32 wherein the
2 fuel precursor comprises a metal alkoxide.

1 35. The vehicular inflatable safety assembly of claim 32 wherein the
2 fuel precursor comprises potassium t-butyl carbonate.